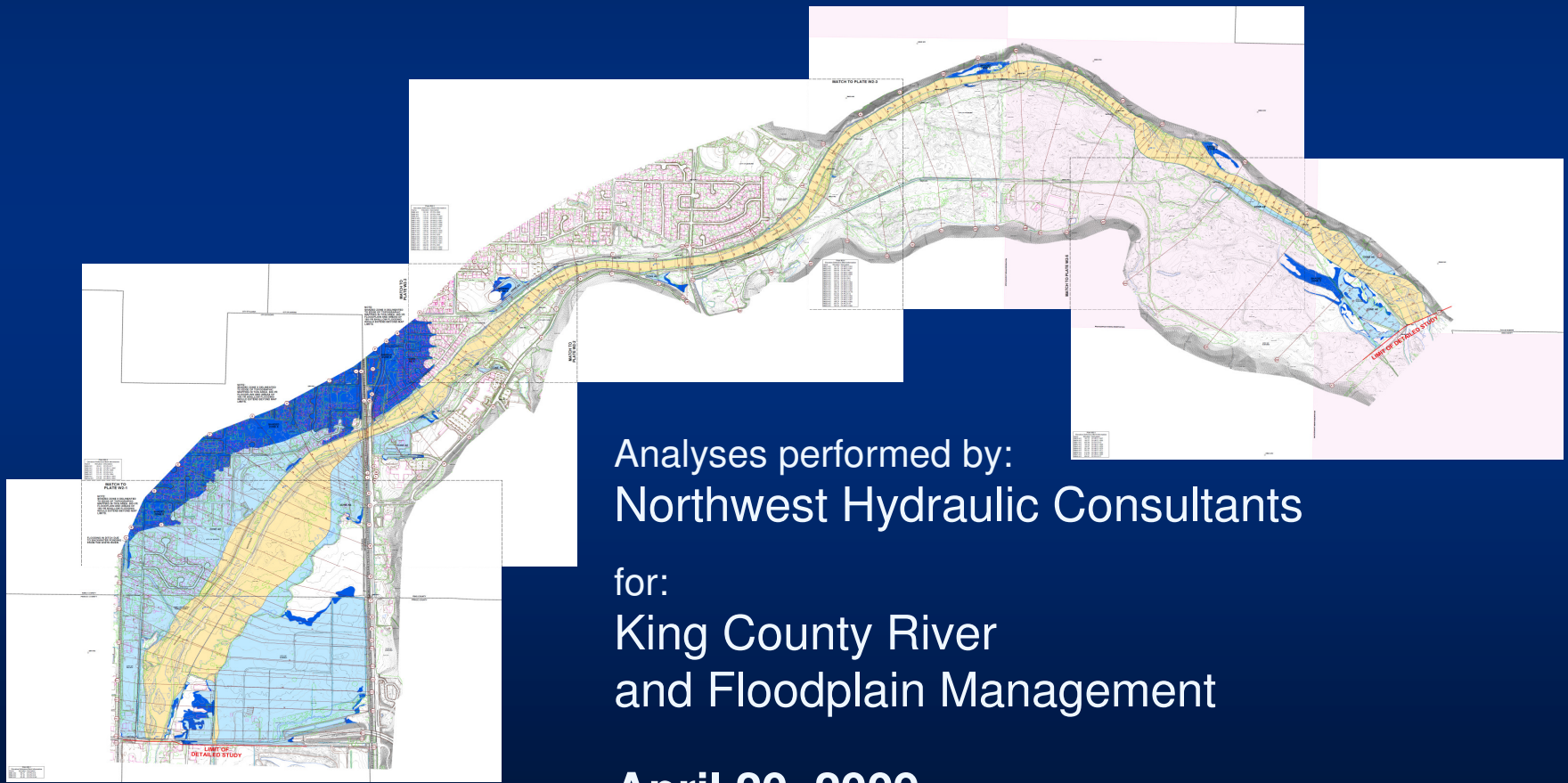


# Agenda

## Presentation to Pacific City Council

- Flood Study Coordination
  - Jeanne Stypula – King County River and Floodplain Management
- Technical Analyses
  - Larry Karpach – Northwest Hydraulic Consultants, Inc.
- FEMA Mapping Process and Flood Insurance
  - Ryan Ike - Federal Emergency Management Agency, Region X
- Washington State Flood Hazard Regulations
  - Chuck Steele – Washington State Department of Ecology
- King County – Countyline Project Status
  - Jeanne Stypula – King County River and Floodplain Management
- Questions

# Overview of White River Floodplain Mapping Study Zone 2 – River Mile 5.0 to RM 10.6

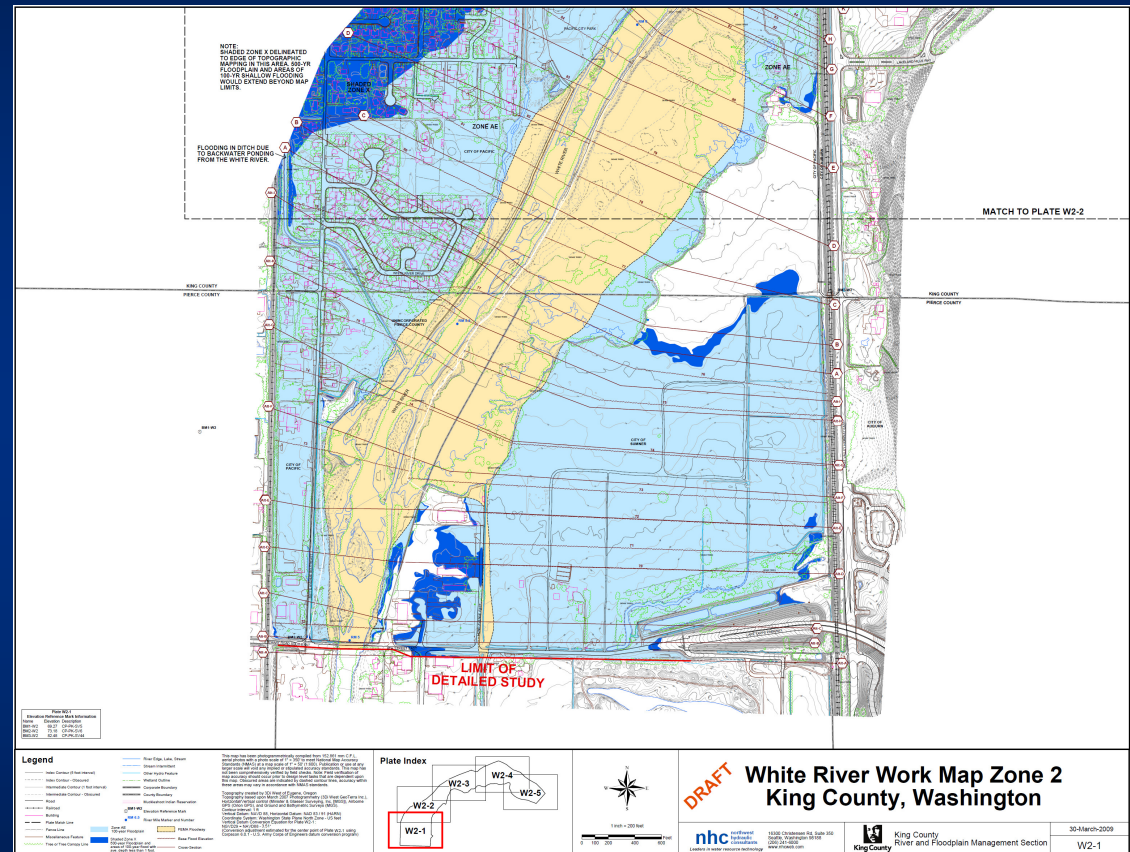


# Study Objective

- The White River flood study was initiated by King County to develop up-to-date and accurate floodplain analyses. The analyses provide the technical information necessary to evaluate and update FEMA's County-wide Preliminary Digital Flood Insurance Rate Map (DFIRM).
  - Effective (printed) White River floodplain maps in King County were based on a study by the USGS in 1980s.
  - FEMA's Preliminary DFIRM for King County used data from the effective maps
  - The Zone 2 study area covers portions of the City of Auburn and the City of Pacific.
  - The Zone 2 study transitions to the Pierce County DFIRM at its downstream end

# Key Technical Tasks – New Data & Analyses

- Channel Surveys
- Aerial Photography
- Topographic Mapping
- Hydrologic Analysis
- Hydraulic Modeling
- Floodway Analysis
- Flood Inundation Mapping
- Study Reporting





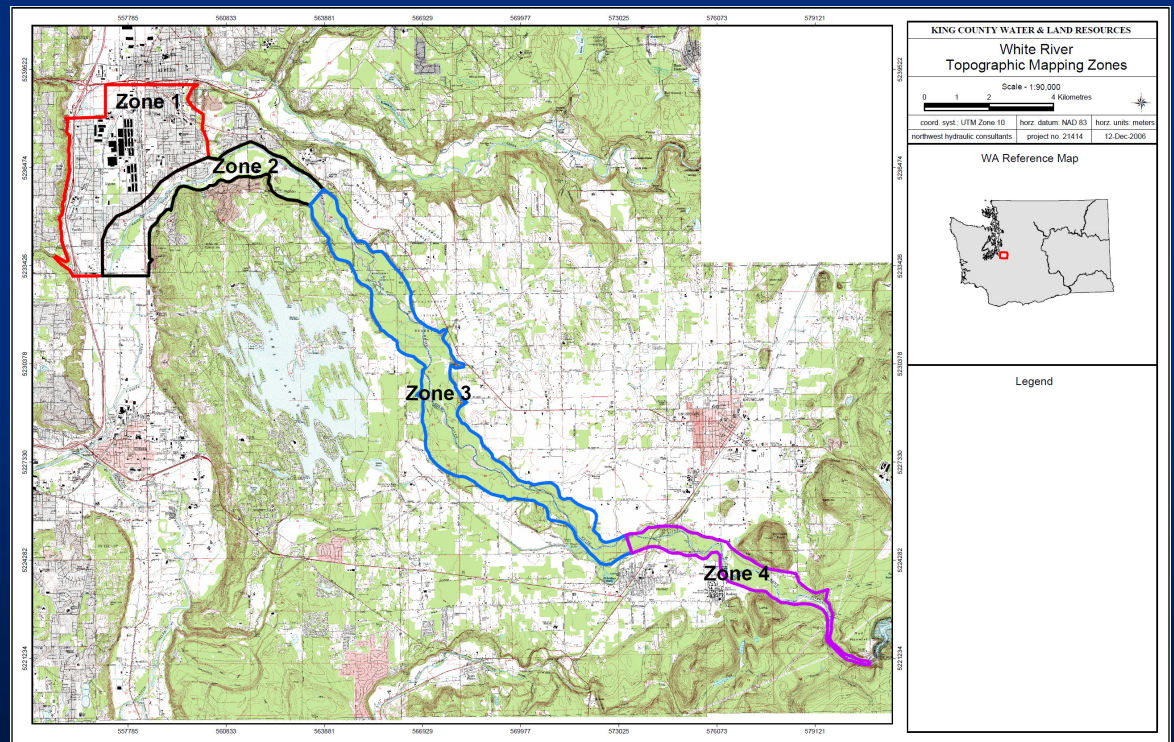
# New Bathymetric (channel) Surveys

- Surveyed 5.6 Miles of the White River from downstream of Stewart/8<sup>th</sup> Street (RM 5) to downstream of Muckleshoot Reservation (RM 10.6)
- Surveyed by wading or from pontoon boat using GPS equipment and total station
- 56 cross sections surveyed in 2007 including resurvey of previous FIS cross sections.
- 17 cross sections near County line were surveyed or resurveyed in March 2008.
- Additional detail collected to define bridges and the trail along the left (east) bank near the County line



# New Topographic Mapping

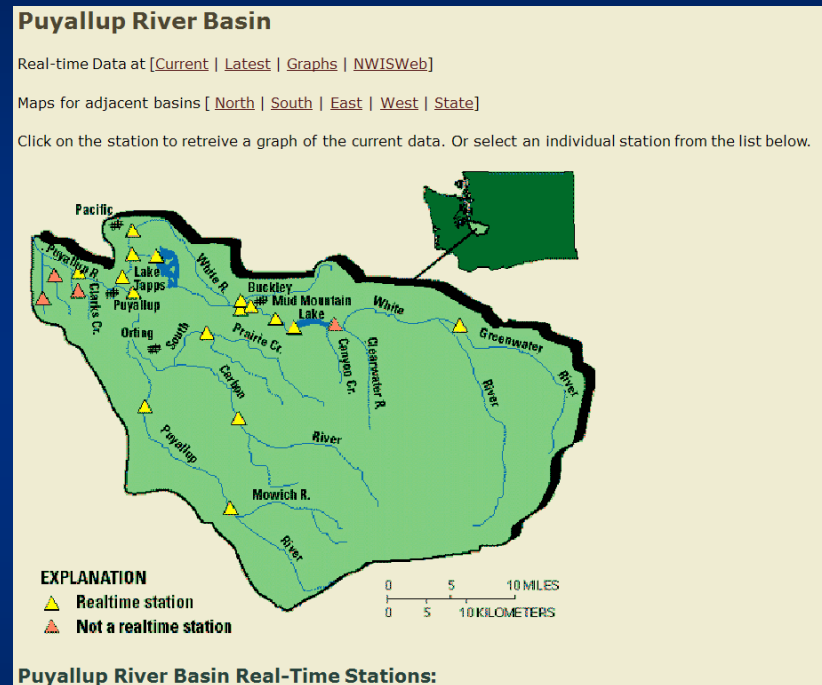
- New Aerial Photography for four zones along the White River flown on March 29, 2007
- Feature data collection and mapping for Zones 2 and 4 was completed in 2007
- New 1-foot contour topographic mapping produced for White River Zone 2, from 8<sup>th</sup> Street East to RM 10.6
- Base maps produced in ArcGIS at 1" = 200 foot scale





# Hydrologic Analysis

- Used available USGS gage data including White River near Sumner, White River near Auburn
- Used data for 1946 – 2007 period
- Data adjusted to account for current USACE operations and for local inflow at other locations
- Hydrology approach and results submitted to FEMA for review
- Final Discharge Quantiles:



**Table 4: Final Proposed White River Peak Discharge Quantiles**

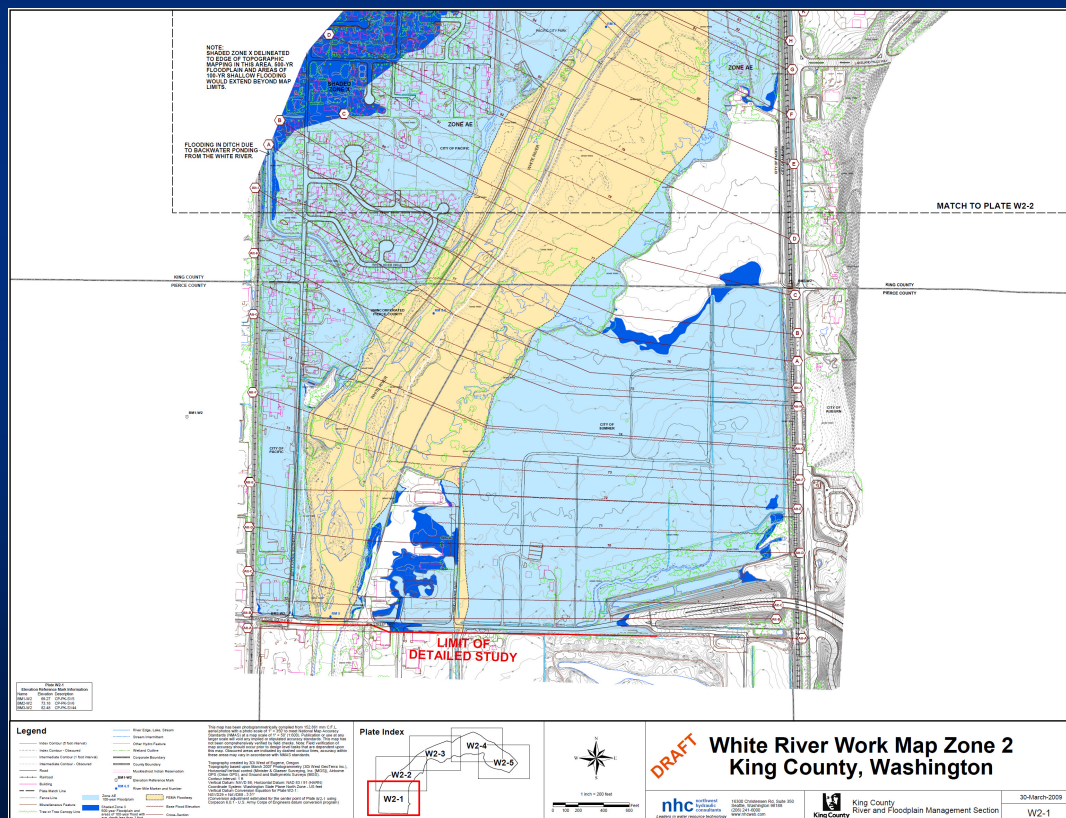
Description of Analysis	Basin Area (mi <sup>2</sup> )	Peak Discharge Quantile (cfs)			
		10-year	50-year	100-year	500-year
At Mud Mountain Dam	400	11,900	12,300	12,350	14,500
Upstream of Boise Creek	410	12,300	12,900	13,000	15,400
Downstream of Boise Creek	427	13,000	13,900	14,000	16,800
At Auburn	454	14,000	15,300	15,500	19,000

# Hydraulic Modeling and Analysis

- Used other Study Products as input (e.g. cross sections, topography, hydrology, high water mark surveys, etc.)
- Steady Flow Modeling of river hydraulics using U.S. Army Corps of Engineers HEC-RAS Model
- Calibration to recent historic flood events (January 2006, November 2006, March 2007, February 1996)
- Recalibration to January 2009 flood event
- Simulation of 10-, 50-, 100-, and 500-year steady state flows
- Levee failures (as per FEMA) considered at 4 sites along the lower reach, primarily in the area downstream of R Street
- Final floodplain analysis merges “with levee” and “without levee” conditions

# Floodplain Mapping

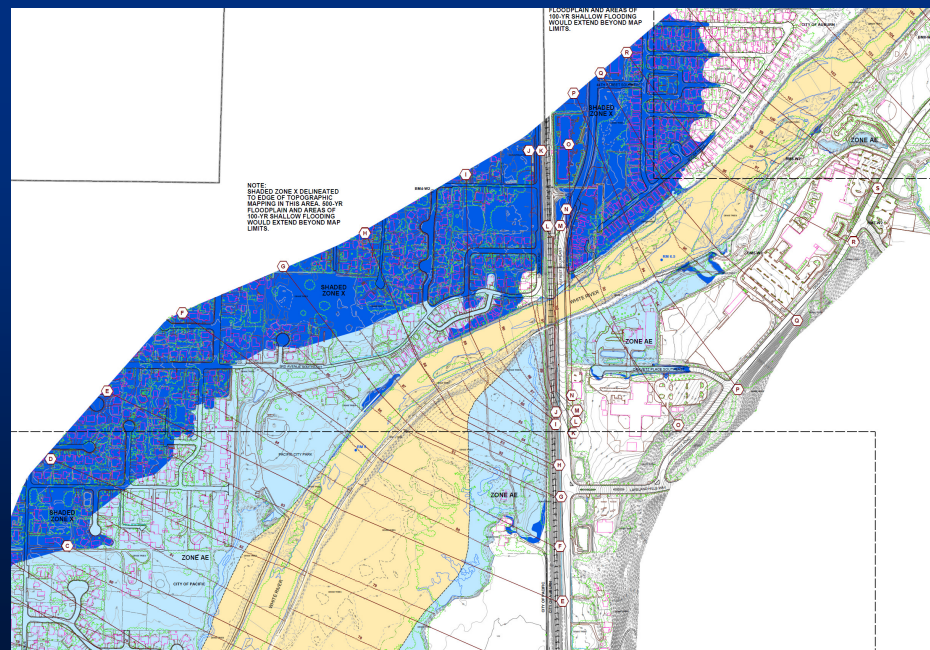
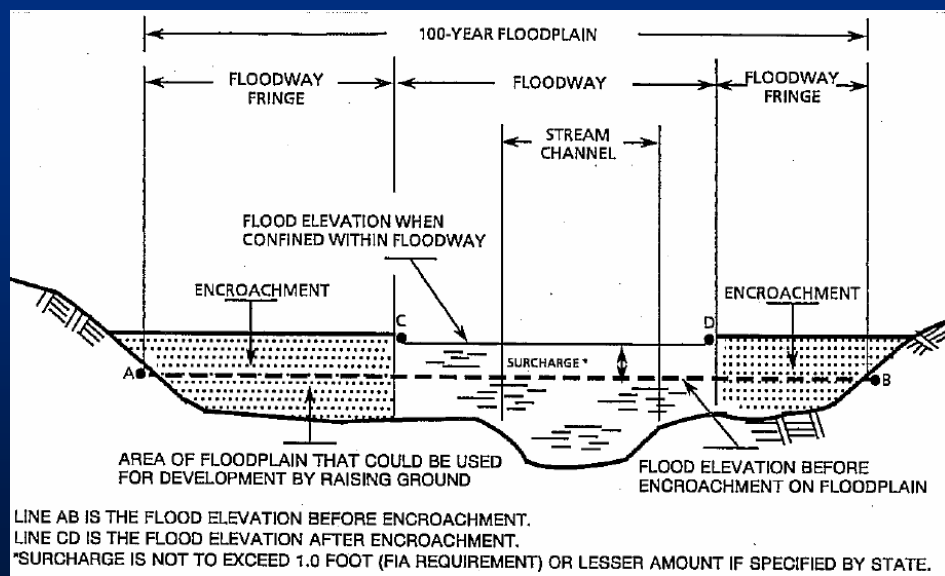
- Transferred data from hydraulic model to topographic map
- Developed Base Flood Elevations (BFEs)
- Mapped 100-year and 500-year inundation limits
- Plotted main channel flood profiles for 10-, 50-, 100-, and 500-year events
- Transferred floodway widths to maps and finalized floodway mapping





# Floodway Analysis

- 100-year flood event simulation becomes “base flood scenario”
- Floodway area must pass 100-year flood without exceeding 1 foot rise in water surface elevation at any point (when compared to base flood)
- Floodway defines area with significantly greater development restrictions



# Study Documentation

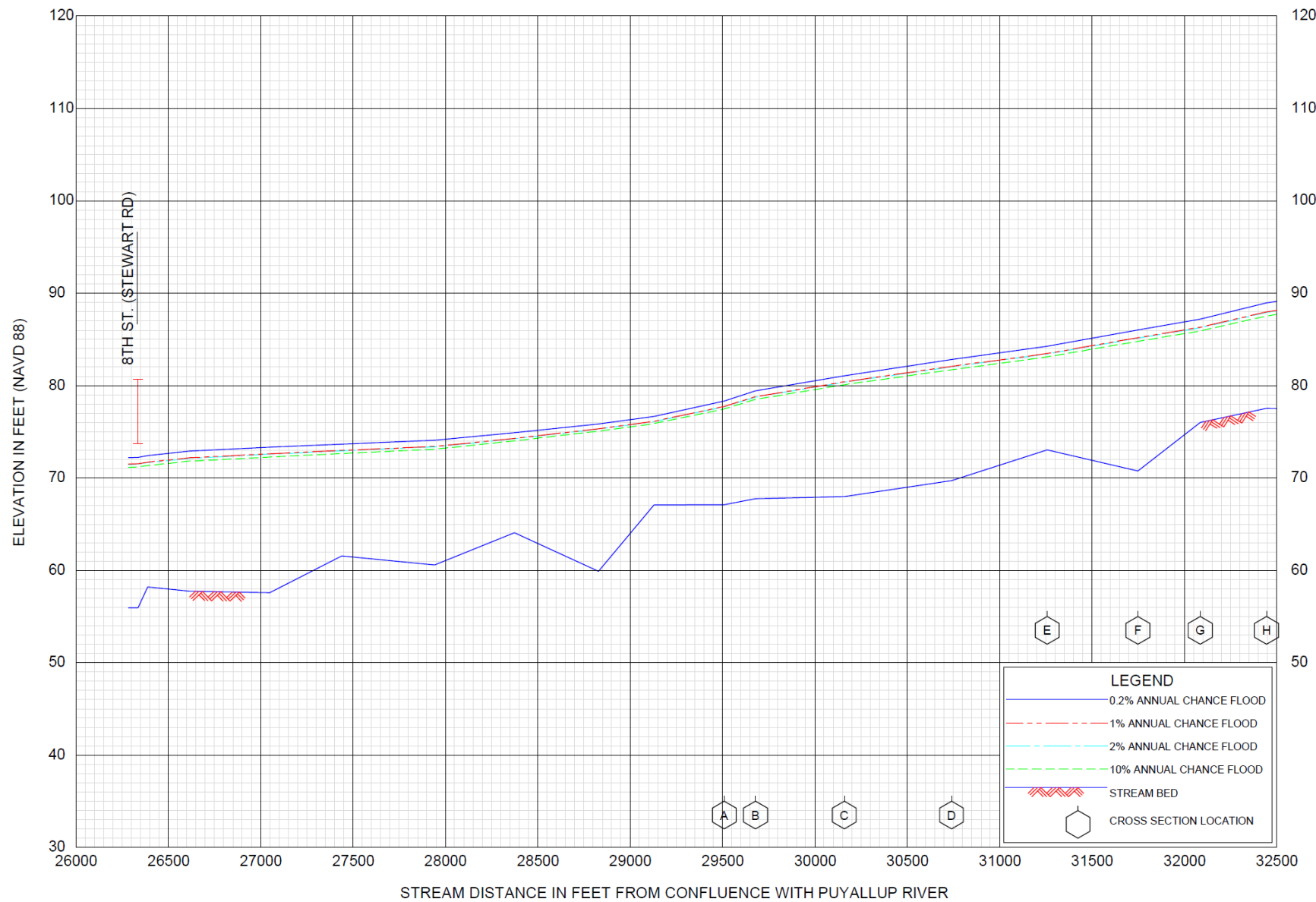
- Data to be submitted and reviewed by FEMA includes:
  - Topographic Mapping
  - Hydrologic Modeling Approach and Results
  - Hydraulic Model (HEC-RAS)
  - Inundation Mapping
  - Floodway Data
  - Study Report
- Revised DFIRM data layers will also be provided to FEMA
- All study data and analyses have been developed in accordance with FEMA Guidelines and Specifications
- Draft floodplain maps will be technically reviewed by FEMA and are subject to revision

# Draft Results – Floodplain and Floodway



April 20, 2009

# Draft Results – Water Surface Profiles



FLOOD PROFILES  
WHITE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY  
KING COUNTY, WA  
& INCORPORATED AREAS

Z2-1

April 20, 2009

# Expected Next Steps

## FEMA Review and Publication

- FEMA has been consulted and is anticipating the submission of new flood study for the White River
- FEMA will review technical materials to ensure the study meets Federal requirements
- After FEMA approves the technical data for the new flood study, FEMA will print a Preliminary Flood Insurance Rate Map
- FEMA publication and approval process will follow



# Contact Information

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